



Editorial: Reflections on coastal climate change adaptation in North West Europe

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This special issue focuses on climate change adaptation in coastal areas in North West Europe. Building on the experiences of the INTERREG IVB NWE Innovative Management For Europe's Changing Coastal Resource project (IMCORE), the issue explores adaptation in relation to a range of spatial and temporal scales and drivers. The case studies presented highlight the importance of multi-discipline as well as transnational working as well as recognizing the value of collaborative working between researchers and practitioners.

The Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC) recognises the need for both adaptation and mitigation and provides an impetus for national governments to strengthen their societies' ability to cope with climate change impacts [1]. Whilst this has been ratified by both the European Union and the national governments of North West Europe [2] there are frequent calls in the press for further action by national governments in the region for example: [3] alongside concern related to the mainstreaming of climate adaptation into other policy spheres at all governance levels [4]. Indeed, in the calendar year prior to writing this editorial, north west Europe has experienced extreme storm events (Ophelia), the most significant snow falls in over 50 years followed by a heat wave has swept across swathes of the northern hemisphere [5]. In the UK climate change scientists have joined forces to send an open letter to the Prime Minister urging her to challenge the climate-sceptic US president on the occasion of his first official visit to the UK [6]. These are certainly both interesting and challenging times for climate change adaptation in the region.

In this context, this special issue on climate change adaptation in North West Europe is timely as it provides useful insights into climate change adaptation practice and how best to approach this complex, multi-faceted issue which more frequently seems to stimulate rhetoric rather than tangible action. Focusing on coastal areas, which arguably may be the most vulnerable areas to climate change impacts in this region [7], the issue includes lessons from researchers and practitioners working in tandem. This experience was gained through the INTERREG IVB NWE Innovative Management For Europe's Changing Coastal Resource project (IMCORE) and augmented by further insights from subsequent, allied research by IMCORE partners.

The IMCORE project, which ran from 2008 to 2011, pioneered a range of innovative methodologies for coastal managers to tackle climate change adaptation at a variety of spatial scales. IMCORE implemented an Expert Couple Node approach, initially trialled in COREPOINT (COastal REsearch and POlicy INTEGRation, funded project under INTERREG IIIB, NWE). This saw nine geographically discrete couples of local government authorities and research groups share their experience and benefit from insights from across North West Europe (and beyond) in order to develop Adaptation Plans. By adopting an inter-disciplinary and sustainable science approach, the project provided practical training materials and an associated website for a wide-ranging audience [8], and stimulated much debate and discourse across academics, policy makers and practitioners regarding the mechanics of the various techniques developed and tested, whilst providing reflection on the governance context in which these methods were being pioneered. In addition to local activities, knowledge was transferred through an international project conference in The Hague and contributions to a Strategic Initiative Cluster, SIC Adapt and direct contribution from IMCORE partners to European Environment Agency programmes. This special issue serves to stimulate further discourse by sharing our lessons and observations to the wider *Marine Policy* global readership.

Adaptation has been recognised at international level through United Nations Sustainable Development Goals (SDGs) directly through Goal 13, Climate Action but it also has relevance to several other SDG including 8, 14 and 15 - Good Jobs and Economic Growth, Life below Water and Life on Land respectively [9]. The broad range of papers presented here provides a window into various dimensions of climate change adaptation from a variety of perspectives. Whilst the need for a multidisciplinary approach Grand Challenges is well recognised [10], many of the papers in this issue have also developed out of a close inter-relationship between academics and local practitioners and policy makers. This sustainability science approach built on the experiences and lessons from the previous COREPOINT project [11] which demonstrated the long-term value of this approach to general coastal management [12]. Our coastal focus is important because of the economic imperative associated with significant assets and related interest

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in Blue Growth in these areas within our region, with coasts facing a disproportionate growth as a consequence of increased utilisation and development over the last number of decades and the expectation that this trend will continue into the future [13].

The coastal perspective, as a consequence, cuts across the EU's priority mainstreaming policy areas (energy, transport infrastructure, urban areas, agriculture) [14] and interfaces with Europe's Marine Strategy Framework Directive (2008/56/EC), Maritime Spatial Planning Directive (2014/89/EU) and the associated Integrated Maritime Policy [15]. Our consideration of range of spatial scales and drivers is vital given the contrasting priorities and challenges associated with adaptation arising across multiple spatial frames [16]. Our focus on local areas is particularly relevant, given tensions in implementing and downscaling national prescriptions and policy to the grass-roots level. Evaluation of hands-on adaptation at this level is also less well documented even though it is at this level that the impacts of climate change will be experienced [17]. The papers also address a range of time frames, reflecting on some of the tensions inherent within and between the multiple time scales required for coastal adaptation planning.

Contributions to this volume

The first paper by Rutherford et al. [18] provides the context for the issue, outlining the approaches taken to develop the adaptation strategies for the nine IMCORE sites across North West Europe as well as introducing the associated scenarios developed to underpin these. The systematic evaluation of the strategies presented in this paper highlights different styles of implementation across the sites and the significance of institutional maturity and the length of period of collaborative working in determining progress in adaptation planning. Gray et al. [19] explore the strengths of scenario analysis further. Whilst demonstrating the potential of scenarios to overcome some of the key barriers within the adaptation process [19], this paper highlights some of the key issues associated with the longer-term horizons associated with these approaches, as weak long-term institutional drivers compete against the immediate priorities and significant other pressures of managers and planners.

The papers by Ballinger and Dodds [20] and Cooper et al. [21] demonstrate some of the issues associated with current approaches to coastal defence management, which are central to shaping future coastal adaptation along vulnerable shorelines of the region. The latter [21] stresses the continued preponderance of case-by-case evaluation of coastal defence structures and the associated dominance of property protection as a driver for human interventions. Ballinger and Dodds [20] note issues associated with downscaling of regionally based data and information for local coastal decision-making, along with inconsistencies associated with the transparency of the scientific evidence base for shoreline management plans; plans which attempt to provide a regional, strategic and long-term approach to managing coastal risk in England and Wales. Both papers propose improvements to coastal defence in line with contemporary management paradigms, notably associated with ecosystem services and sustainability science: Cooper et al. [21] argue for a balanced approach in which both protection of property and coastal ecosystem services are considered; Ballinger and Dodds [20] suggest a need for improved national quality assurance of scientific evidence and clearer guidance on how evidence should be presented to relevant stakeholders at local levels to support coastal decision-making.

O'Keefe et al. [22] investigate particular stakeholder needs further, focusing on climate change awareness of the commercial seaport sector. Drawing on a survey of the maritime sector in Ireland, the paper highlights a significant lack of awareness and understanding of climate change by the sector. However, the paper does simultaneously draw attention to measures already being undertaken by the sector which, although not labeled under the banner of coastal adaptation, are serving to improve resilience of the sector. Continuing under the theme of stakeholder awareness, Reis and Ballinger [23] draw on a range of IMCORE and related work which evaluated education efforts across

Wales to demonstrate the value of interactive long-term learning rather than one-off training events in embedding climate literacy in our communities and associated decision-makers. They also question the adequacy of current climate change information and education frameworks in supporting effective adaptation activities.

The final paper, by O'Mahony et al. [24] which uses Cork Harbour as a case study, provides some hope in addressing some of the issues outlined in the previous papers. The paper shows the value of a local partnership-based Integrated Coastal Zone Management (ICZM) model in facilitating capacity building and knowledge exchange as well as providing the long-term learning support much needed for local coastal adaptation planning. Whilst ICZM may not be de rigour and voluntary coastal partnerships appear under constant financial pressure [25], the value of coastal partnerships in providing an overarching framework and learning environment for coastal adaptation planning is a strong take home message from this special issue but one which requires further study in order to evidence these findings further and embed this practice more commonly elsewhere.

It is hoped that this *Marine Policy* Special issue has helped understand some of the key successes and challenges associated with coastal climate change adaptation present in the North West European region but applicable across the wider European and indeed International spheres. By drawing on a range of perspectives, spatial and temporal scales and evaluating a number of different approaches to climate change adaptation, this issue has proven the importance of multi-disciplinary and trans-national working. It has also demonstrated the benefits of mutual understanding and collaboration between scientists and practitioners in underpinning effective adaptation measures and highlighting the key potential of local coastal partnerships in facilitating such an approach.

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